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POWDER RIVER

TRACT PROFILE
COLSTRIP C TRACT, MONTANA

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BUREAU OF LAND MANAGEMENT

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SITE SPECIFIC ANALYSIS
6. COLSTRIP AREA C

INTRODUCTION

A. PURPOSE AND NEED

The purpose of this analysis is to comply with the Secretary of Interior's decision that a sufficient number of tracts be delineated and selected for sale from the areas designated in land use plans as acceptable for further consideration for leasing to meet the regional leasing target. As a result of the 1979 Powder River Management Framework Plan (MFP) Update, federal coal in this tract was identified for further consideration for development through competitive leasing.

It should be noted that the acreage and legal description of federal coal discussed in this Site Specific Analysis is limited to those areas that have been included in the comprehensive land-use plan, in accordance with Section 3(A)(i) of the Federal Coal Leasing Amendments Act of 1976 and the decision of the U.S. Secretary of Interior June 2, 1979, that the coal to be selected for sale come "from the areas designated in land-use plans as acceptable for further consideration" (page 60 of Volume I of the Secretarial Issue Document). The coal deposit tonnage listed from the Engineering Report of the U.S. Geological Survey includes areas outside of the BLM planning area.

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I. ALTERNATIVES, INCLUDING THE PROPOSED ACTION

A. NO ACTION ALTERNATIVE

Under the no action alternative, federal coal would not be leased. Because of the "checkerboard" ownership patterns, development would not occur on this tract. Approximately 165 million tons of coal, recoverable by existing methods, would not be mined. It should be noted that mining will continue to take place in the nearby area with mining of existing leases in the tract beginning in 1982.

B. PROPOSED ACTION

The proposed action is to offer for lease 853 acres of federal coal within a 6,683-acre tract of land in Rosebud County, containing 165 million tons of recoverable coal for development as a mine extension. The tract comprises an area identified as an economical mining unit for a 30-year strip mining operation. The tract contains existing leases of 1,586 acres of federal coal, 853 acres of unleased federal coal, 3,604 acres of fee (private) coal and 640 acres of state coal. The tract is located 6 to 7 miles southwest of Colstrip and 3 to 4 miles west of State Highway 315. See Map 1 for location and legal description.

The mining operation would have an annual production of 5.5 million tons and would employ 30 persons during construction of the conveyor system and 165 persons during production. The tract is composed of 66 million tons of federal coal, 85 million tons of fee (private) coal and 14 million tons of state Coal. Surface distur- bance will be approximately 135 acres a year beginning in 1982. Total disturbed area will be 6,683 acres from mining. Facilities and haul roads are in place. An 11-mile conveyor belt will be construc- ted to haul coal from this area to the power plant site located in Colstrip.

For more specific information on the proposed mining operation, refer to the Engineering Report prepared by the U.S. Gelogical Survey.

The proposed action assumes that proper mining and reclamation will be carried out according to existing state and federal regulations. These include: Office of Surface Mining Reclamation and Enforcement (OSM) regulations (30 CFR 700-899), Environmental Protection Agency (EPA) regulations (40 CFR 0-1399), Department of the Interior's coal management program regulations (43 CFR 23 and 3400 and 30 CFR 211), and regulations of the Montana Department of State Lands.

Tract Delineation Report Summary

Tract Name: Colstrip C State: Montana

The Colstrip C tract is located in the center of the northern Powder River Basin, Rosebud County, Montana. The tract contains two recoverable coal beds, the Rosebud and McKay, which are present in multiple seams.

The coal deposit occurs in the top part of the Fort Union Formation (Paleocene), which comprises approximately 3,000 feet of sandstones, shales, siltstones, and coal seams. The formation occurs in nearly flat-lying beds. The coal is subbituminous in rank and weighs 1,770 tons per acre foot. There are no known geologic hazards to surface mining in the Colstrip C tract. See the tract profile summary for the salient geologic data for the tract.

The generic mining plan calls for a surface mine using draglines, electric shovels, dump trucks, loaders, scrapers, and other support equipment. The coal would thus be mined to a depth of 200 feet or until the limiting stripping ratio (6:1) has been reached. The plan indicates that the coal would be shipped by railroad to an electrical utility out of the Powder River Region.

Tract Profile Summary

Colstrip C

Coal Data	Proposed Action
Total Reserves (Million Tons Strippable)	22
Recoverable Reserves (Million Tons)	federal 20 (total 165)
Average Coal Thickness (Ft.)	30
Average Overburden (Ft.)	80
Coal Rank	subbituminous
Percent Recovery	90
Proximate Coal Analysis	
Percent Moisture	23.1
Percent Ash	8.5
Percent Sulfur	0.7
BTUs Per Pound	8,950
Mine Life (Years)	3.0
Annual Production Rate (Million Tons)	5.5
Tract Area (Acres)	853
Surface Mine/Truck Shovel Operation	
Employment	
Construction	30
Mine Operation	165
Environmental Data	
Water Requirements	63 acre-feet/year.
Transportation, Land Use, VRM, Vegetation	Moderate during mining; low after mining.
Soils	High to moderate.
Reclamation	Low, if successful.
Wildlife	Moderate loss of habitat.
Noise, Air Quality	High during mining, low after successful reclamation.
Agriculture	Moderate during mining; low after successful reclamation.

TRACT PROFILE INTRODUCTION

Background

In July 1979, the BLM, Miles City District Office completed the Powder River Resource Area update for portions of Powder River, Custer, Big Horn, Treasure and Rosebud counties. The land use planning process included applying unsuitability criteria, multiple-use conflict evaluation, and surface owner consultations. As a result of that work, areas were identified that could be further considered for coal development. The areas are available for consideration for new competitive leasing, leasing by exchanging and modifying existing leases.

Following land-use planning the BLM requested expression of interest which, along with other information, guided the GS in delineating this tract. Results of that work are summarized in this profile.

Personnel from BLM, Miles City District inventoried the tract to determine the site specific resource values and then analyzed potential environmental effects of coal development on this individual tract. Among other items, the unsuitability criteria (43 CFR 3461) were reconsidered on this site-specific basis. Any new findings of unsuitability are reflected in the delineation and development proposal of the tract described in this profile.

To be further considered for new competitive leasing, the tract will be presented to the Regional Coal Team who guides and reviews tract ranking and selection and sale scheduling procedures that develop alternatives which would be analyzed in a regional environmental impact statement (EIS). The EIS would analyze the site-specific and regional cumulative effects of coal leasing and development. Alternatives addressed in the EIS would include different combinations of tracts that meet a regional coal leasing target. The analysis of those groups of tracts would result in different impacts than the assessment made in this document for this specific tract. During the process this preliminary tract could be modified. Ultimately, the Secretary will select specific tracts for lease sale. If the tract is leased, the lessee would be required to submit a plan for mining and reclamation (M&R) to the Secretary of Interior, Office of Surface Mining (OSM) for review and approval within 3 years after leasing. Once a mining plan has been submitted, OSM would review the proposed developments of the mining plan. OSM would prepare a site-specific environmental assessment or EIS prior to approval of the mine plan.

Development of the tract is in accordance with the federal coal management program adopted by the Secretary, Department of the Interior, in June 1979. Basis of the program was, in part, the Final Environmental Statement for the Federal Coal Management Program. Implementation procedures are contained in Title 43 - Code of Federal Regulations - Part 3400 (43 CFR 3400). Authorizing actions are The Mineral Leasing Act of 1920, as amended; The Mineral Leasing Act for Acquired Lands of 1947, as amended; the Federal Land Policy and Management Act of 1976; the Surface Mining Control and Reclamation Act of 1977; the Multiple Mineral Development Act of 1954; the Department of Energy Organization Act of 1977; the National Environmental Policy Act of 1969; the Federal Coal Leasing Amendments Act of 1976, as amended; the Act of October 30, 1978, and Federal Regulations concerning federal coal leasing and development including 43 CFR 3400; 30 CFR 211; and 30 CFR 700-899.

In adopting the coal program, the Secretary established a tentative competitive coal leasing target of 776 million tons for 1982 in the Powder River Region of Wyoming and Montana. Subsequent sales would then follow on a 2 to 4 year cycle.

Purpose and Need for Action

Purpose of the action is to offer strippable federal coal reserves that can be further considered for coal leasing and development to help meet the energy needs of the nation.

This tract profile contains a summary of the tract delineation report and a site-specific analysis (SSA). The United States Department of the Interior, Geological Survey (GS) delineated the tract while the Bureau of Land Management (BLM) completed the site-specific environmental inventory and preliminary analysis.

Figure 1.2-1

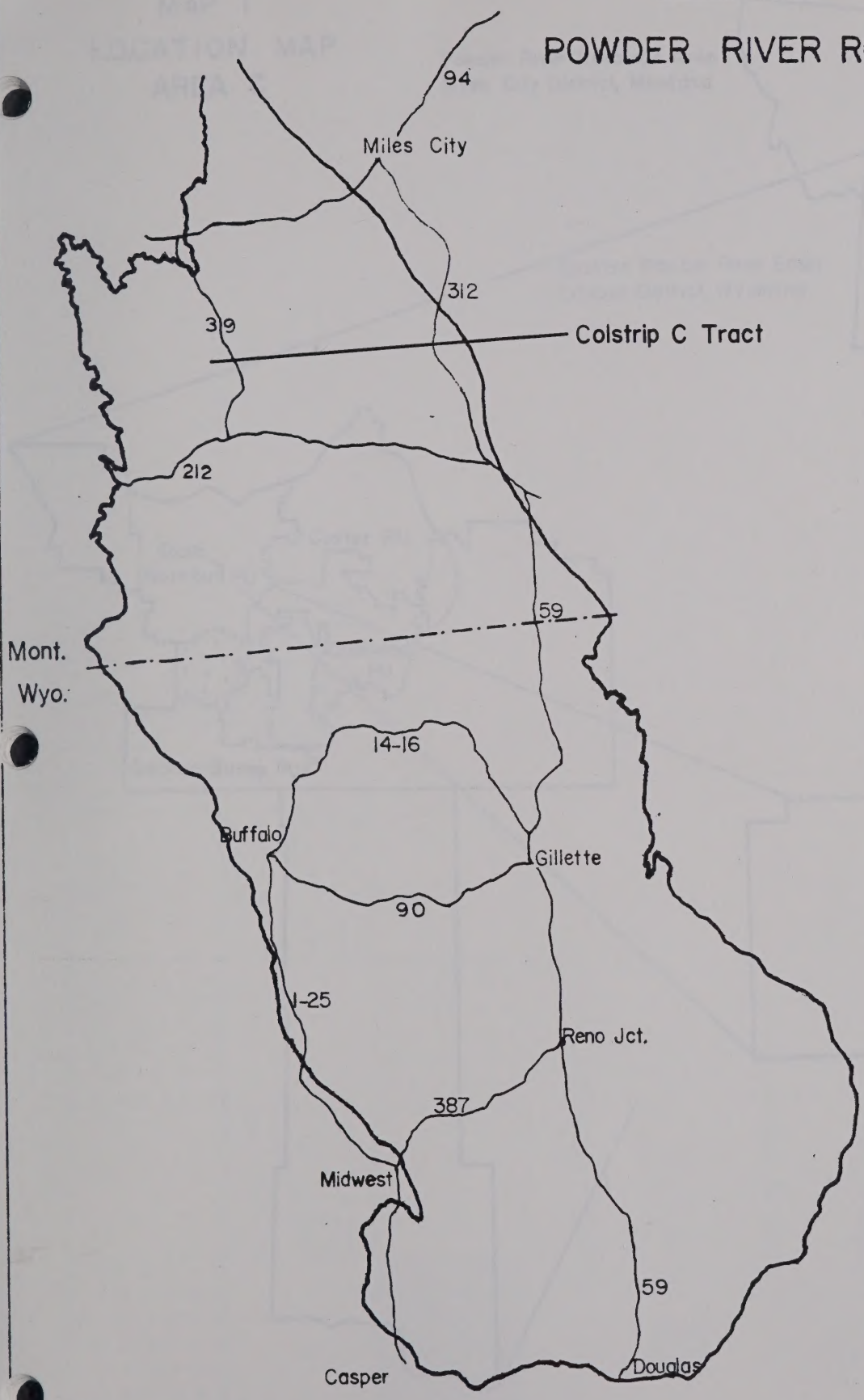
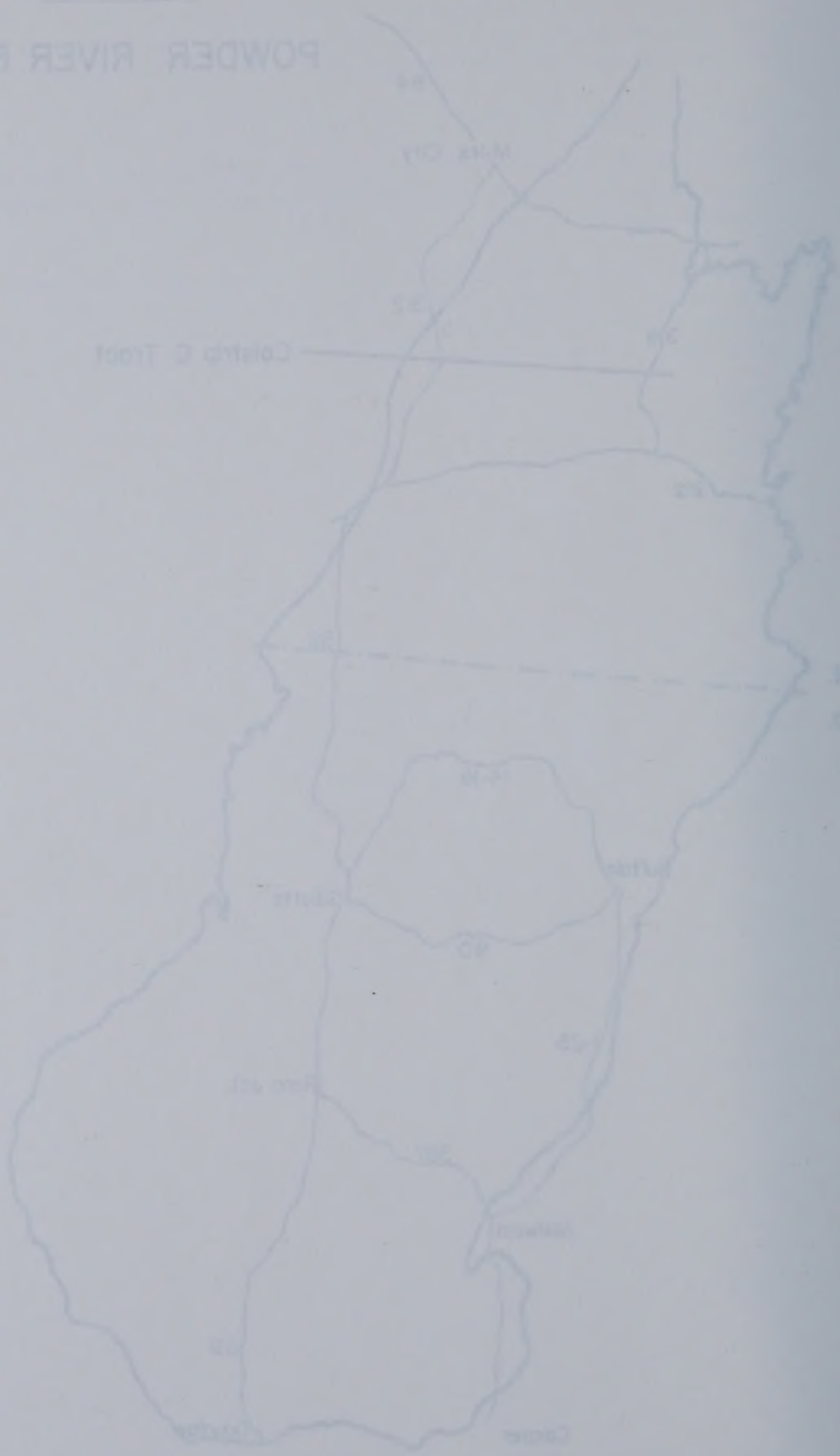
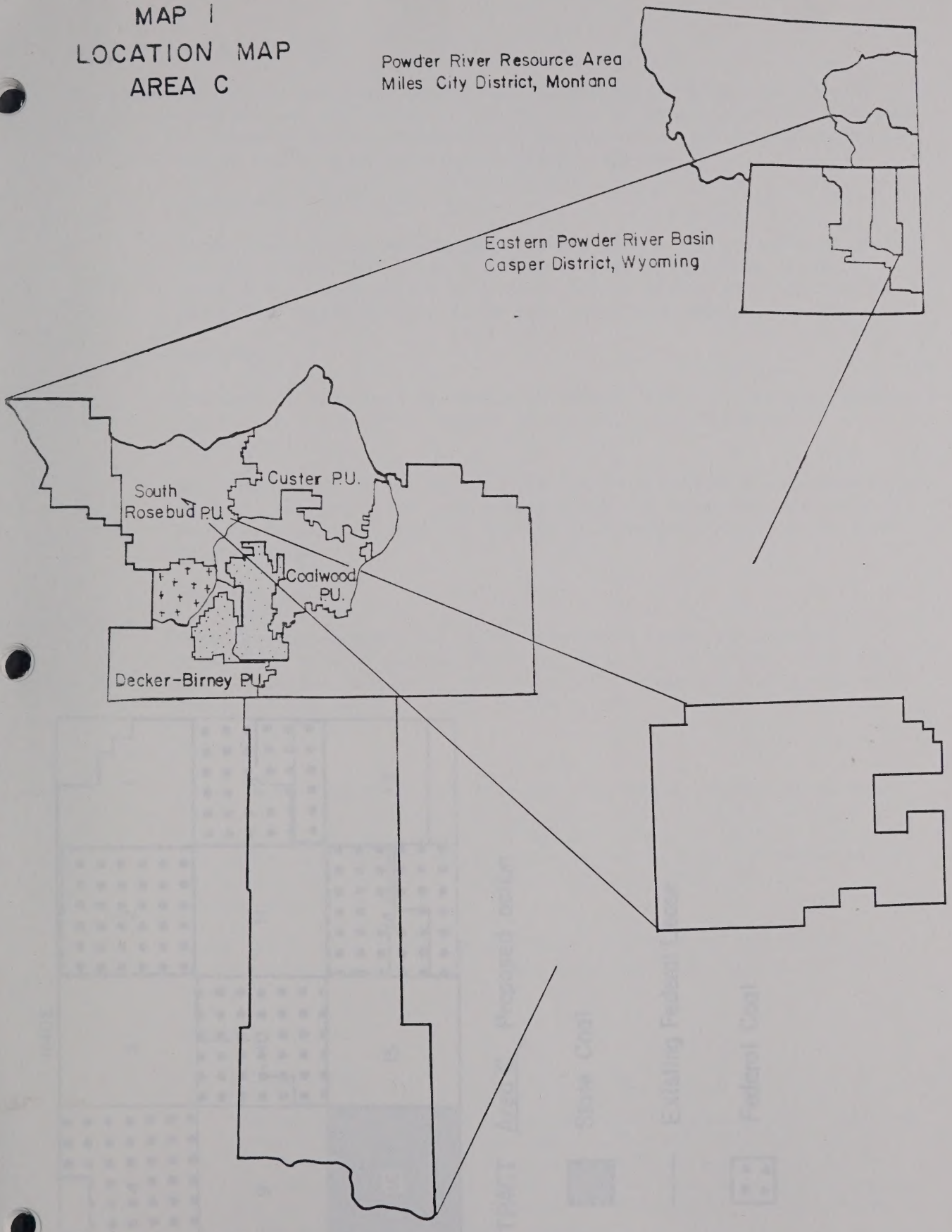
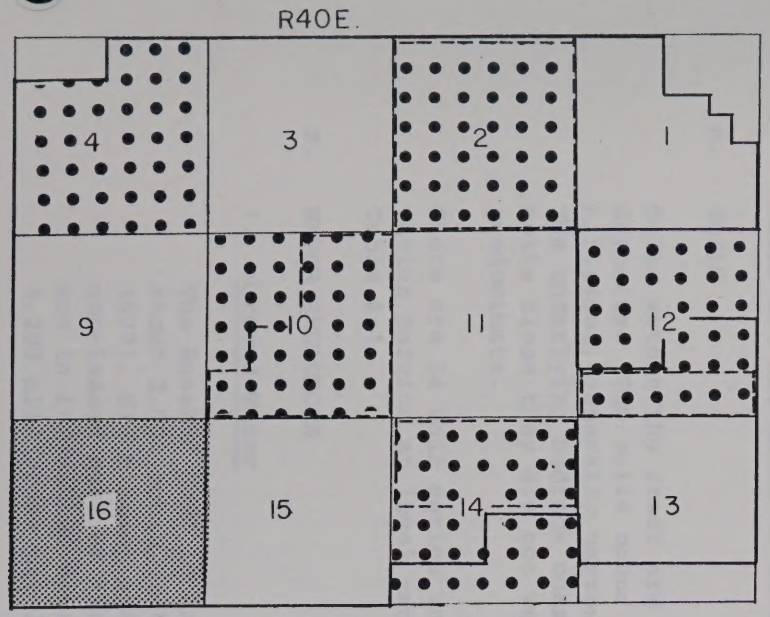


FIGURE 1.2-1



MAP I
LOCATION MAP
AREA C





TRACT Area C Proposed action

State Coal

----- Existing Federal Lease

Federal Coal

II. AFFECTED ENVIRONMENT

The environment that currently exists and changes anticipated from ongoing trends are included in this section. Information is presented within the time frame of the proposed action including the alternatives, and is restricted to that information required to assess significant impacts.

A. TOPOGRAPHY

Surface expression within the Colstrip Area C EMU consists of gently rolling slopes, the broad alluvial valley of East Fork Armell's Creek and a ridge formed by a resistant sandstone unit. Elevations range from 3,765 feet to 3,380 feet above sea level.

B. GEOLOGY

The area is underlain by sandstone, shale, clinker, and coal belonging to the Tongue River member of the Ft. Union Formation (Paleocene).

Strippable coal in the EMU is confined to the Rosebud bed. The McKay seam is generally less than 5 feet thick and under excessive overburden. Cover overlying the Rosebud seam ranges from 0 to 250 feet in thickness.

C. PALEONTOLOGY

Known paleontological resources in the area consist of poorly silicified tree fragments, leaf impressions, and pieces of unidentified calcareous shells. Fossils possessing exceptional scientific value are not known to occur in the tract.

D. SOILS

Soils within the tract are formed in sandstone, shale and alluvial deposits. The soils occur along narrow ridges, gently sloping hillsides, generally narrow floodplains and wide, shallow valleys. The underlying bedrock characteristics are closely reflected in the soils since they are not well-developed and loamy textures predominate.

There are 34 soil series in the tract, surveyed by the Soil Conservation Service at level two. The soils discussed are listed in Table 6-1.

E. WATER RESOURCES

1. Ground Water

The Rosebud coal in Area C is saturated. Ground water flows at about 2,000 cubic feet per day (cu ft/day) (Van Voast et al 1977). Eight stock and two household wells are in use in the non-leased part of the tract. At least four undeveloped springs are in it. Medium total dissolved solids (TDS) concentration is 1,200 milligrams per liter (mg/L).

COLSTRIP C SOIL EROSION
TABLE 6-1

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil Erosion Potential 1/ Wind	Water	Surface Acres	Percent of Area	Soil Reconst. Potential 2/	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
Birney-Cooco-Kirby complex			X	2-15	Low	Mod	31.	1	Poor	Stoniness	16	24	113
Birney-Kirby Channery loams; Birney-Kirby Channery loams, moist			X	4-25	Low	High	74	1	Poor	Stoniness	39	43	287
Birney-Kirby-Cabbart complex	X(.30)		X(.70)	15-70	Low	High	121	2	Poor	Stoniness	19	100	452
Busby fine sandy loam; Chinook fine Sandy loam			X	2-8	High	Low	5666	9	Good	—	2277	—	553
Busby fine sandy loam			X	8-15	High	Mod.	349	6	Good	—	1368	—	377
Busby-Blackhall fine Sandy loams	X(.30)		X(.70)	8-25	High	High	541	9	Good	—	1412	168	449
Busby-Rock Outcrop complex	X(.35)		X(.65)	8-25	High	Mod.	315	5	Good	—	740	41	438
Busby-Yetull complex			X	8-25	High	Mod.	12	2	Poor	Too sandy	27	1	30
Cabbart-Yawdim-Rock Outcrop complex	X			15-70	Low	High	318	5	Poor	Excess lime	16	296	789
Cambothids-Torrifluvents association, Channeled			X	0-8	Mod.	Mod.	178	3	Fair	Too Clayey	107	456	328
Cooco-Birney Complex			X	2-8	Mod.	Mod.	37	1	Poor	Excess lime, Stoniness	19	36	128
Delport-Cabbart-Yamac loams	X(.35)		X(.65)	8-25	Mod.	High	473	8	Poor	Excess lime	194	582	1145
Floweree silt loam; Kremlin			X	0-2	Mod.	Low	64	1	Poor	Excess lime	38	46	237

1/ Soil Depth Classification and Soil Erosion Potential is derived from the S.C.S. Soil Series Descriptions and Interpretations for Rosebud County.

2/ Soil Reconstruction Potential is derived from the National Soils Handbook.

3/ Depth (in acre feet) of available soil calculated from acres x acre feet/acre = suitability of soil material for plant growth.

Soil Mapping Unit Name	Depth 1/ Shallow 0-20"	Moderately Deep 20-36"	Deep 36+"	Percent Slope	Soil Erosion Potential 1/ Wind	Water	Surface Acres	Percent of Area	Soil Reconst. Potential 2/	Soil Hazard Conditions	3/ Suitability of Soil Material for Plant Growth (Acre Feet) Good	Fair	Poor
loam; Lonna silt loam													
Floweree silt loam; Kremlin loam; Lonna silt loam			X	2-8	Mod.	Mod.	982	16	Poor	Excess lime	563	385	3962
Kobar silty clay loam			X	0-2	Mod.	Low	194	3	Poor	Excess lime, too clayey	—	421	549
Kobar silty clay loam			X	2-8	Mod.	Mod.	260	5	Poor	Excess lime, too clayey	—	564	736
Kobar silty clay loam			X	8-15	Mod.	High	79	1	Poor	Excess lime, too clayey	—	171	224
Kobar silty clay loam, gullied			X	2-15	Mod.	High	108	2	Poor	Excess lime, too clayey	—	234	306
Lonna silt loam			X	8-15	Mod	High	49	1	Poor	Excess lime	28	—	217
Lonna-Cabbart-Yaukim complex	X (.40)		X (.60)	8-25	Low	High	241	4	Poor	Excess lime	1143	176	906
Ustic Torriorthents			X	15-35	Mod.	High	75	1	—	*too variable to rate	—	—	—
Yamac loam			X	2-8	Low	Mod.	311	1	Poor	Excess lime	286	389	880
Yamac loam			X	8-15	Low	High	137	3	Poor	Excess lime	126	171	388
Yamac-Busby complex			X	2-8	Mod.	Mod.	168	3	Poor	Excess lime, too sandy	341	106	353
Yamac-Busby complex			X	8-15	Mod.	High	187	3	Poor	Excess lime, too sandy	380	129	393
Yamac-Cabbart loams	X (.45)		X (.55)	8-25	Low	High	121	2	Poor	Excess lime	56	143	342
Yamac-Delpoint loams			X	4-15	Low	High	120	2	Poor	Excess lime	74	144	275
TOTALS							6111	100			9269	4826	14857

Soil Depths
Shallow - 15%
Deep - 85%

Soil Erosion Potential
Wind
Low - 21%
Moderate - 48%
High - 31%

Water
Low - 13%
Moderate - 43%
High - 44%

Soil Reconstruction Potential
Good - 29%
Fair - 3%
Poor - 67%
*% too variable to rate

Suitability of Soil Material for Plant Growth
Good - 30%
Fair - 16%
Poor - 49%
Unsuitable - 5%

2. Surface Water

East Fork Armell's Creek runs through the tract. It discharges an average of 2,200 acre-feet (ac ft) annually near Colstrip, and flows except during extreme cold and during hot, dry summer periods. Only about 200 acres of the entire Armell's Creek drainage is flood irrigated (USGS 1979). Total dissolved solids concentration (TDS), an index to salinity, varies from 178 to 4,110 mg/L (Knapton and McKinley 1977). Mean TDS is about 2,900 mg/L. Annual sediment yields are estimated at 0.5 ac ft/sq mi for non-mined land in the Colstrip area (USGS 1979b).

3. Alluvial Valley Floors and Flood Plains

The East Fork Armell's Creek flood plain and preliminarily-defined alluvial valley floor (AVF) runs through the tract. There is much overlapping of the floodplain and AVF. The flood plain is unsuitable for mining and final AVF determination will be made by the Office of Surface Mining at mine plan stage.

F. VEGETATION

The Colstrip Area C Economical Mining Unit (EMU) consists of 6,752 acres. Of this, 6,111 acres will be treated as being disturbed by mining. The 611 acres over unleased federal coal contain one major vegetative rangeland type (Payne 1973), which is the ponderosa pine savannah (see Regional paper, unpublished manuscript in Miles City District Office of BLM). The area included in the vegetative type consists of: (a) grassland - 1,856 acres, (b) sagebrush-grassland - 1,704 acres, (c) ponderosa pine - 1,154 acres, (d) Other - 1,397 acres. Within this vegetative type, there are varying range sites with varying production yields (pounds per acre) and condition classifications. There are approximately 742 AUMs being produced per year on the tract.

G. LAND RESOURCES

1. Agriculture

Agriculture operations in this area are mainly livestock, hay (alfalfa or grass-legume) and small grains mainly winter wheat. The bottomlands are flood-irrigated during spring runoff then subirrigated for the balance of the growing season. The water in East Fork Armells Creek is too high in salts and alkalinity for irrigation the rest of the growing season. Alfalfa, grass-legume hay or small grains (oats or barley) are crops raised to feed the livestock in the winter months. Winter wheat is raised to sell. Approximately 21 percent of the tract, which is Class II, III, and IV land, is currently being used as cropland. In addition, there are approximately 2400 acres of Class III and IV privately-owned land (39.3 percent of the tract) that are suitable for cropping, but not presently cropped.

Approximately 2,222 acres could produce approximately 1,962 tons of alfalfa and support 1,111 AUMs or produce 63,462 bushels of winter wheat per year and have 178 acres suitable for tame pasture, which could provide 104 AUMs.

2. Recreation

The area is relatively isolated from recreational use or demand. There is no recreational development in or near the area. Some hunting use may occur, but other recreation use is unlikely. Since no public access exists, any use of the tract for recreation would require landowner permission. This restriction effectively prohibits recreational use of the area. The area contains no wilderness potential.

3. Other Land Uses

The land within the tract is presently used for ranching. There are no industrial activities and the only other use of the tract is for a small portion occupied by a county road. Existing roads are gravel and receive low use and maintenance. Rail service exists to operating mines in the area.

H. WILDLIFE

The Colstrip Area C tract is characterized as open shrub-grassland with some areas of ponderosa pine savannah. Dominant shrubs are big sagebrush (Artemisia tridentata), silver sagebrush (Artemisia cana), and skunkbrush (Rhus trilobata). This vegetative mosaic provides habitat for a wide variety of wildlife.

One sharp-tailed grouse arena occurs in the EMU over private minerals. This arena is immediately adjacent to a section of federal minerals where 20 acres were excluded to maintain nesting habitat. Attendance at this arena has averaged 9.7 males over a 7-year period, while average attendance at all arenas in a 160-square-mile area was 13.1 males over the same time period. Relative density for the EMU is 0.14 arenas/sq mi.

Mule deer use of the area is light as the preferred rough breaks areas used for cover are not present in much of the tract. Summer densities of deer in the EMU are approximately 0.56 deer/sq mi. Very little winter use occurs in the EMU.

Antelope use of the EMU has been light in past years. Most use occurs in the western portion during the spring and fall time periods with up to 20 antelope being observed. The Colstrip area is considered to be marginal antelope habitat due to the timbered nature of the area.

Pheasant use of the EMU is minimal with the majority of use found along the East Fork of Armell's Creek and the roadside ditches. The population is very low compared to other areas in eastern Montana and probably exists only because mine personnel feed them during the winter.

The bald eagle has been observed as a migrant in the Colstrip vicinity and the golden eagle has been identified as nesting in the EMU. This nest site is located over private minerals where no unsuitability exclusions could be made for it. There are no other threatened or endangered species known to occur in the area.

State of Montana species of special interest or concern possibly found in the EMU are the Swainson's hawk, upland sandpiper, clay-colored sparrow, Brewer's sparrow, mountain bluebird, snapping turtle and plains hognose snake.

I. CULTURAL RESOURCES

Within the Colstrip Area C tract, 100% of the surface has been intensively inventoried in a low density survey contracted by private industry (Fredlund and Fredlund 1974). The survey identified eight prehistoric sites, including four lithic scatters, one lithic scatter with associated ceramics, one rock shelter, one stone circle site, and one stone structure site. Two historic homesteads and one stone structure which could not be identified as prehistoric or historic association were included. Isolated artifacts were not recorded in this survey.

Present impacts to cultural resources derive principally from rodent disturbance, agricultural activity, vandalism, and erosion. The 1974 survey methodology and results do not lend themselves to reliable estimates of site density; however, the tract is environmentally similar to other areas adjacent to the east and a "best guess" based on intensive survey (Munson 1980, L. Fredlund 1978, 1979, 1980a,b) is a site density of 2-3 sites per 40 acres. No sites have been determined eligible for the National Register of Historic Places; there is a 10% probability of locating National Register eligible sites, based on present information.

J. VISUAL RESOURCE MANAGEMENT

The tract is located in an area near strip mining with some ranching use. Current intrusions are those activities associated with the active mines, with minimal effects from ranching operations. Because of the industrial nature, scenic quality is fairly low and dominated by the existing mining. This area principally consists of rolling terrain and is categorized as class "C" in scenic quality because of its common physiographic and vegetative characteristics.

K. ECONOMICS

Present employment in the affected areas of Colstrip and Forsyth in Rosebud County and Broadus in Powder River County is approximately 1883 energy workers. New workers, including both construction and operational employees at Western Energy Co., Peabody Coal and MONTCO mines, the increased railroad activity and Colstrip 3 and 4 power plants will increase 1983 energy-related employment by 2,152 workers. About 679 jobs in secondary sectors in Rosebud County would form during the same time period largely as a response to the new primary jobs.

By 1987 energy-related employment drops in Rosebud County by 2,027 workers due to the withdrawal of construction work forces from Colstrip 3 and 4 and the MONTCO mine, partially offset by small gains in mining and power plant operating work forces. This decrease in primary employment would lead to a drop in total employment in Rosebud County of 1,360 jobs. (Some growth in secondary employment between 1983 and 1987 would occur due to long term changes in the composition of the economy.)

L. SOCIOLOGY

1. Population

Colstrip and Forsyth are undergoing another boom in population growth due to the construction of Colstrip 3 and 4. This rapid increase in population will strain the existing communities. Once the construction period is over, the population and communities will contract again, as they did when the construction of Colstrip 1 and 2 power units was completed.

2. Community Services

See foregoing discussion of population.

3. Attitudes

Overall, most residents in the Powder River coal region favor coal development (BLM 1980). This favorability, however, is not unconditioned; if it is felt that the nation does not need the coal to ease the national energy problems or that reclamation is not possible or not planned, favorability towards coal development would be greatly reduced.

Also associated with attitudes towards coal development are desires to see some controls on development. The controls are of two types: environmental and governmental. Environmental controls are centered around reclamation and concern for water supply and quality. The governmental controls are unspecified, but a strong feeling exists that some level or levels of government should exercise some controlling authority over development. Stated in another way, it is felt that mining companies should not have a free hand in the development of coal.

With respect to whether people were more concerned with environmental or social impacts, the responses were evenly split.

A breakdown of attitudes toward coal development by agricultural-nonagricultural respondents is not available at this time. However, it will be included in the EIS.

M. NOISE

Noises are of an artificial origin due to the use of heavy machinery and explosives in the area.

N. CLIMATE AND AIR QUALITY

The semiarid climate of the study area is characteristic of the continental steppes of the Northern Great Plains, in which the warmest months are the driest. The area has cool moist springs, warm dry summers, and cold moist winters. There are large periodic variations in annual and seasonal precipitation and temperature. The last 10 years have had generally optimum moisture and mild temperatures, but droughts can be expected to recur.

Precipitation in the area varies with elevation and with season. Mean annual precipitation is about 12 inches at low elevations, about 15 to 16 inches at high elevations. Mean annual precipitation at Colstrip is about 15 inches.

Mean annual temperature and seasonal patterns in temperatures are similar throughout the area. Mean annual temperature is about 45°F. Temperatures are lowest in January, averaging about 8°F, and highest in July, averaging about 90°F. High mid-summer temperatures terminate the effective growing season. Relative humidity is lowest in July and highest in winter. The freeze-free season is about 115 days near Colstrip.

Upper winds are generally from the west. Mean seasonal wind speeds range from 12-23 miles per hour at 10,000 feet and 23-35 miles per hour at 18,000 feet. Fall and winter winds are fastest and tend to blow from the northwest, spring winds blow from the west, and summer winds from the southwest. These patterns reflect the predominance of weather systems from the cold polar and Arctic regions in late fall and winter, the Pacific Ocean in the spring, and the Gulf of Mexico in the summer (Northern Great Plains Resources Program 1974). surface wind annual mean speeds in the Colstrip area are about 11 miles per hour. Mean seasonal wind speeds appear to peak in the spring

Data from the meteorological tower at Colstrip indicate that inversions are very frequent. Inversions occur every month of the year, but are prolonged in the winter and broken up in the morning during spring and summer. Inversions are most likely to break up between 8 a.m. and 3 p.m. at Colstrip. Inversion break-up would be most likely to bring high concentrations of pollutants to the ground in winter, when top heights of inversions are lowest. However, early morning (4-5 a.m.) inversions are more frequent in spring, and inversion break-ups occur almost every morning abour 8 a.m. Spring afternoon mixing heights vary considerably, suggesting the turbulence of the atmosphere during this season.

CHAPTER III ENVIRONMENTAL CONSEQUENCES

This section describes the significant environmental effects that would occur with implementations of the proposed action including the alternatives. Such items as threatened and endangered plant and animal species, floodplains and wetlands, and wilderness values have been considered and are discussed as appropriate. Also, negative declarations included in the matrices are not presented within the impact discussion in this section. Principal basis for the analysis is the professional judgments of the resource specialists, public and other agency input, and related works, as referenced.

I. NO ACTION ALTERNATIVE

The no action alternative would result in a "bypass" situation of federal coal resources underlying unleased areas, since mine companies have indicated mining will commence on leased areas in 1982.

Under the no action alternative, about 22 million tons of federal coal would not be recovered. The federal royalty foregone (at 12.5% royalty rate, $10.00 per ton, and 1.07 million tons of federal coal produced per year) would be about $1,338,000, about 1/2 of which ($669,000) would have been rebated to the state. The state severance tax, at about 22% of mine mouth sales price and 1.07 million tons of annual production, would be about $2,354,000. Gross proceeds taxes received annually by the county and schools would be about $248,000 (at 1.07 million tons of production and an effective tax rate of 23.2¢/ton -- taxable value of $3.33 per ton times mill levy of .06955).

Under the no action alternative, the paleontological resource would remain undisturbed. However, the potential for exposure and study of unearthed fossils would be lost.

If mining does not occur on the unleased area, the impacts related to this tract would be experienced only in areas to be mined.

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II. PROPOSED ACTION

A. TOPOGRAPHY

The natural variety of landforms now displayed within the area would be reduced by mining. Changing or altering the natural erosional patterns will increase the rates of the area's sediment yield until such time that natural vegetation can be reestablished.

B. GEOLOGY

The major impact of the proposed action would be the removal of about 22 million tons of currently unleased federal coal, along with coal to be mined from 4,244 acres of private and state coal resources in the tract.

C. PALEONTOLOGY

Fossils may be destroyed during the mining process. However, surface disturbance may unearth fossils that could be collected and studies made of specimens that would have otherwise remained buried.

D. SOILS AND RECLAIMABILITY

The proposed action would have a significant impact on the soil in the tract (See Table 6-1). By the end of mine life, 6,111 surface acres would be disturbed, in addition to 130 surface acres used for out-of-pit haul roads.

Soil impacts include: displacement of soil from wind and water erosion, change in soil structure and natural fertility, and significant problems in revegetation and stabilization on steep slopes.

In the tract, there is a moderate potential displacement of soil by wind erosion of 48 percent and a high potential displacement of soil by water erosion of 44 percent. (See Table 6-1.) Proper seeding of the stockpiles will reduce this.

Disturbances of the soil would result in alterations of soil structure and porosity. This alteration would affect permeability, infiltration rates, soil-air and soil-water relationships and bulk density. The natural fertility would be affected by disruption of the nutrient cycle and a decrease in organic matter content within the soil. Salinity content would increase as a result of the lower calcareous horizons being brought to the surface.

The soil reconstruction potential is derived from the National Soils Handbook (USDA). The soil hazard conditions determine the reconstruction potential. The tract is rated as 29 percent good and 3 percent fair and 67 percent poor for reconstruction. Suitability of the soil material for plant growth is rated as 30 percent good, 16 percent fair, 49 percent poor and five percent unsuitable (see Table

6-1.) The soils rated poor can be reclaimed, but would require more intensive and costly management to be revegetated and stabilized. Reclamation efforts made by Western Energy in the Colstrip area have been good, producing an excess of 1800 pounds of vegetation per acre, three years after reseeding. Costs of this reclamation exceeded $12,000 per acre, but thus far has proved satisfactory. See discussion of short term versus long term impacts following.

E. WATER RESOURCES

1. Ground Water

About 23 wells and at least four springs would be affected outside the tract during mining. Some of these wells are all ready impacted by mining in the vicinity. Flow into the pit during mining would be highest among Colstrip tracts at about 2,000 cu ft/day. Ten wells would need to be redrilled to about the same depths, if needed, after mining. Springs would reappear. Following mining, water quality at the depth of the Rosebud coal seam and above, in the vicinity of the mine, would be degraded by increased salinity. The effect would be long-term and significant. However, the water would still be usable for stock, but would be even more marginal than the poor water currently used for household purposes.

2. Surface Water

Streamflow in East Fork Armell's Creek would be only slightly reduced during mining, if an adequate buffer and diversions are used. Following mining, slight effects on surface flow are possible with proper reclamation. Sediment yields can be considered to be proportional to soil erosion losses discussed in the soils section. Low flow salinity would increase slightly after mining due to increased ground water saline concentrations. However, downstream flood irrigation and spawning would not be affected because of dilution by other water.

3. Alluvial Valley Floors and Flood Plains

Area C is further downstream than Areas A & B, so influence of mining on the channel would be more significant from A & B than C. Mining of the creek would disrupt the flow during mining by diverting and detaining it. After mining, channel stabilization may be a problem, although state and federal regulations require restoration of stream channels.

F. VEGETATION

If the range is in excellent condition (100-76%) there would be an approximate loss of 1,178 to 853 AUMs. However, in its present condition, there would be a loss of approximately 742 AUMs.

Reestablishment of native vegetative communities depend upon climatic conditions, species diversity and reclamation technique. In 1982, there would be 204 acres disturbed by mining and every year thereafter another 204 acres would be disturbed for each year of mine life. By the year 2018, total vegetation should have been reestablished.

The reclamation process for the initial cut would probably be delayed for 2-3 years dependent upon the mining operation. When the mining operation gets into a cut-and-fill situation then the reclamation process would start. Provided there is adequate vegetation present on the reclaimed land, grazing would start after the sixth or seventh year on the initial 151-acre cut and approximately in the fifth year after the mining process becomes a cut-and-fill operation. As mining proceeds in different areas of the tract, not all of the land is utilized for mining at any one time and grazing could occur on portions of the tract.

Mining of the area would temporarily eliminate opportunities for domestic livestock to occupy the surface and to utilize the forage. However, vegetative production may be better after mining (due to extensive reclamation work) and the area may produce more than the current number of AUMs per acre. There is, however, no evidence that the plant community that ultimately evolved would support higher levels of livestock grazing than the premining vegetation supported.

Additional impacts resulting from vegetation disturbances would be (a) possible reduction of the visual aesthetics, (b) increased soil erosion, and (c) reduction in the amount of wildlife and livestock forage.

The Office of Surface Mining assures that the mining company establishes a diverse, effective and permanent vegetative cover to standards set by the Montana Department of State Lands and the federal Bureau of Land Management.

G. LAND RESOURCES

1. Agriculture

The proposed action would have a significant impact on agriculture in the tract (see Table 6-2). By the end of mine life, 2,213 acres would be disturbed, in addition to 120 surface acres used for haul roads.

Impacts on agriculture include displacement of 841 acres (194 acres subirrigated and 647 acres non-irrigated) of class II, III, and IV privately-owned land that would produce, on the average, 1,792 tons of alfalfa and 841 AUMs or 27,195 bushels of wheat per year. In addition, there are 440 acres currently being used as tame pastureland that could produce 393 tons of alfalfa and 358 AUMs or 13,219 bushels of wheat per year.

Colstrip (Area "C")

TABLE 6-2

Surface Ownership	Percent of Area	Acres	Land Capability Class 1/ Non-Irrigated	Land Capability Class 1/ Irrigated	2/ Use of land	Predicted Average Yields (Acres X Ave. Prod. Yield/Acre) = 2/ Wheat Dry-land (Bu)	Wheat Irrigated (Bu)	Barley Dry-land (Bu)	Barley Irrigated (Bu)	Oats Dry-land (Bu)	Oats Irrigated (Bu)	Alfalfa Dry-land (Ton)	Alfalfa Irrigated (Ton)	Tame Hay Dry-land (Ton)	Tame Hay	Pasture Dry-land (AUM)	Pasture Irrigated (AUM)
Private	9.62	588	III	–	Cropland	18846	–	26769	–	–	–	578.5	–	506.2	–	578.5	–
Private	3.17	194	III	II	Cropland	6790	15520	9700	15520	–	–	174.6	1164.0	174.6	–	174.6	1552
Private	0.97	59	IV	–	Cropland	1559	–	2143	–	–	–	49.7	–	41.0	–	49.7	–
Total	13.76	841			Cropland	27195	15520	38612	15520	–	–	802.8	1164.0	721.8	–	802.8	1552
Private	5.51	337	III	–	Tame Pastureland	10602	–	14999	–	–	–	319.8	–	296.8	–	319.8	–
Private	1.69	103	IV	–	Tame Pastureland	2617	–	3559	–	–	–	73.2	–	61.5	–	73.2	–
Total	7.20	440			Tame Pastureland	13219	–	18558	–	–	–	393.0	–	358.3	–	393.0	–
Private	14.68	897	III	–	Not Presently Cropped	27778	–	39212	–	1815	–	868.0	–	817.6	–	868.0	–
Private	2.91	178	III 65% IV 35%	–	Not Presently Cropped	3239	–	4628	–	–	–	104.2	–	81.0	–	104.2	–
Private	21.68	1325	IV	–	Not Presently Cropped	35684	–	49278	–	–	–	1094.2	–	929.7	–	1094.2	–
Total	39.27	2400			Not Presently Cropped	66701	–	93115	–	1815	–	2066.4	–	1828.3	–	2066.4	–

1/ Soil Capability classification is derived from the ~~unpublished~~ Rosebud County Soil Survey Report.

2/ Cropland, Land Suitable for cropland and Average predicted crop yield derived from the unpublished Rosebud Soil Survey Report, and data from Agricultural Stabilization and conservation Service, Rosebud County.

a. Economic Impacts on Agriculture

Assuming, for analytical purposes, a ranch output figure of $164 (LLS = lost livestock sales) per cow/calf unit and using 10.75 AUMs or 0.7 tons of hay as the forage requirement of, respectively, a fully allocated cow/calf pair[1], or fully allocated cow/heifer with calf in utero[1], we have (assuming a five-year disturbance cycle) the following formula:

$$LLS = \$164 \frac{.167 \text{ minewide AUM}^2}{10.75} + \frac{.167 \text{ minewide tons of hay}^2}{.7}$$

Based on the formula above, the loss of ranch output (LLS) due to mining of Colstrip Area C EMU would be about $75,000 per year (at peak disturbance). The loss of secondary income dependent on ranch output (wages and profits in business/government(s) which supply or depend on agriculture) would be about $18,800 per year.

b. Rancher Perspectives On Economic And Social Impacts

The one agricultural landowner in the Colstrip Area "C" EMU was contacted and was determined to hold 76% of the land in the EMU. The landowner felt he would suffer a net economic hardship in the case of mining. The landowner felt he would suffer a lowering of level of quality of life as well as being opposed to mining development.

2. Recreation

No significant long-term impacts are expected to occur on the tract. Some secondary impacts would occur. Overall recreational demand on federal and private lands will increase due to population increases and the construction or relocation of roads at the mine site might improve legal and/or physical access to some areas. These increases would probably reduce levels of recreation enjoyment due to increased crowding, litter and pollution at and near developed recreation sites.

[1] A fully allocated cow/calf pair (ccp) or cow/heifer with calf in utero (ccu) includes the amount of forage needed to sustain the ccp/ccu plus the pro rata share of the forage needs of replacement heifers, herd bulls and horses (if any) and is, therefore, the sum of both direct and indirect forage needs.

[2]Using a 5-year disturbance period over the 30-year mine life, .167 of the forage would be lost at peak disturbance.

3. Other Land Uses

Impacts on land use would be relatively minor but highly concentrated. Industrial activities would be introduced into an area of no previous activity with great ability to support additional mining without construction of major facilities or improvement of existing transportation routes. The existing ranching and wildlife uses of the tract would be displaced for the life of the mine, but would again be possible after reclamation. The mine would disturb 4,531 acres plus additional offsite acreages for roads and utilities. Assuming respective rights-of-way widths of 100, 200, and 60 feet, the additional disturbed area would total 428 acres for relocation of 6.75 miles of the counry road, an 11-mile conveyor belt and a powerline route from Colstrip.

Changes in the land from these mine-related uses would be mostly temporary and insignificant after reclamation.

The existing road system would have to be upgraded with roads to and within the site. Problems associated with this include increased trespass, vandalism, litter, and fire hazard potentials. Increased road and rail traffic also increases the potential for more accidents because of greater exposure. The impacts would cease at the end of mining if unnecessary transportation corridors are abandoned and reclaimed; however, this type of land use commonly remains longer than the activity it serves.

H. WILDLIFE

The impacts upon wildlife habitats and populations are summarized in the matrix (Appendix). Impacts are rated for the projected 30-year life span of the mine.

One sharp-tailed grouse arena along with the surrounding nesting habitat would be lost in mining. Since the area-wide populations of sharp-tailed grouse appear to be stable or increasing and similar habitat exists on adjacent areas, the impacts on the grouse population would probably be minimal.

Habitat lost to mining would displace up to four mule deer and 20 antelope from all or portions of their traditional summer use area.

Mining would destroy the golden eagle nest site, if the sandstone outcrop on which it is located were mined. Mining would also disturb the hunting territory for this nest, but the extent of disturbance is not known as the actual territory has not yet been defined.

Habitat for non-game birds, mammals and reptiles would lost during mining. No estimate of numbers displaced is known, but it is felt it will be a low impact, based on the availability of similar adjacent habitats.

Increased traffic on the county roads would increase the number of game and non-game birds and animals killed by vehicular accidents and illegal hunting activity. No estimate of this impact can be made at this time.

I. CULTURAL RESOURCES

All cultural resources within the tract boundaries will be subject to direct impact from construction of haul roads and mining activities. Direct impact would result in damage and destruction of sites, artifacts, their immediate environmental context, and the related data. Cultural resources not subject to immediate direct impact will be subject to increased erosion, increased access and increased vandalism. Cultural resources buried by colluvial and alluvial deposition and not previously located in surface inventory would also be destroyed.

Should the tract be leased, a mitigation program would be undertaken for all affected cultural resources. Development of avoidance and preservation alternatives is preferred; if these are not feasible, a scientific program of data retrieval would be developed and implemented for all cultural resources within the tract.

J. VISUAL RESOURCE MANAGEMENT

Mining would completely change the character of the tract. Visual impacts would increase in the form of land disturbances due to the mines, roads, and utilities. Changes to the topography, vegetation and scenic quality would occur. There are existing industrial influences in the area, therefore, the contrast would not be extreme. Along with this, some additional decrease in visibility would occur from dust and vehicle emissions. Overall, adverse impacts would be relatively insignificant during mining because of existing influences from area mines. Scenic quality is not expected to be significantly altered after reclamation. Due to the location these visual impacts would be experienced only by persons visiting the mines. Generally, the visual impacts would be about the same as those of other mines in the vicinity. All of the impacts would either cease or be reduced to very low levels when mining ends and reclamation is completed.

K. ECONOMICS

If Western Energy obtains the lease, then no significant economic impacts would occur from leasing of uncommitted federal coal resources in Colstrip Area C other than lengthening mine life and continuing the same level of mine employment that will result from mining operations to commence on leased acreage in the tract.

L. SOCIOLOGY

1. Population

Because there will be no additional employment and population immigration, there will be no impacts from mining in Colstrip Area C over and above what is already occurring with construction of Colstrip 3 and 4 power units.

2. Community Services

See the previous discussion on population.

3. Attitudes

The impacts of development on social attitudes cannot be assessed until after development has occured. There is no way to estimate what changes, if any, in attitudes would occur.

M. NOISE

The present noises would increase slightly from industrial origins as heay mining equipment, rail and road traffic and explosives use are increased from present levels.

N. CLIMATE AND AIR QUALITY

Continuation of surface mining of Area C would result in loading basically the same levels of fugitive dust to the air as is being experienced in this area during current mining. The air quality of the study area is generally excellent, except for local fugitive dust and gaseous emissions. Particulate air quality standards in this area have been violated and approximately a 120-square-mile region in the Colstrip area has been classified as a nonattainment zone for total suspended particulates (TSP). Under law, nonattainment areas may not create new sources of particulates and measures must be taken to control present dust-emitting sources. The Northern Cheyenne Indian Reservation is approximately six miles south of the proposed leasing area. This Reservation has a Class I air quality designation, which will have a very large influence on the coal leasing proposal.

IV. SHORT-TERM VERSUS LONG-TERM IMPACTS

A. SHORT TERM

Production through life of mine is estimated at 165 million tons of coal. Most of the resource would be exported, however, some may be used on site for power generation. The tract would be temporarily committed to a single use that would in turn impact other potential uses.

Short-term impacts of mining on wildlife would be the loss of four sharp-tailed grouse arenas and the surrounding nesting habitat. Up to 34 mule deer and 50 antelope would be displaced during mining. One pair of nesting falcons and one pair of nesting golden eagles

would be disturbed during the life of the mines. Habitat for non-game birds, mammals and reptiles would also be lsot in the short term.

B. LONG TERM

Evidence of mining and reclamation would remain in the form of less contrasting topography and an alteration of soil texture and porosity.

Long term impacts on wildlife would be dependent on the success of reclamation. If shrubs and ponderosa pine cover cannot be restored, the vegetative diversity of the area would be decreased along with an attendant decrease in the variety of birds and animals that use the existant vegetative types.

V. IRREVERSIBLE AND IRRETRIEVABLE EFFECTS

The coal removed by mining and that left by current recoverable techniques would be lost from future use.

VI. NET ENERGY ANALYSIS

A net energy analysis was calculated using the guidance contained in BLM-Washington Office Information Memo 79-282, August, 1979. Approximately 38 British Thermal units (BTUs) would be expended to produce a pound of coal. That pound of coal, in turn, would produce about 8,462 BTUs. The ratio of energy produced to that expended is over 225 BTUs/1 BTU.

The net energy relationship (ratio of energy produced to energy consumed) for the Colstrip "C" EMU is 350 to 1.[1]

1 Based on the Btu value per pound of coal as given in the tract delineation reports and on an average input energy value of 25.6 Btu's of energy consumed for each pound of coal produced (average of the energy consumption of the Decker mines as described by USGS in a 1977 EIS and the WECO area B expansion as described by the Montana Department of State Lands in a 1978 EIS). Only direct energy consumption was considered (the ratios shown do not contain any estimate of energy used in transporting the coal from the mine to the demand center).

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Soils	There are 34 soil series in the tract mapped at level two in a survey done by the Soil Conservation Service which are found along narrow ridges, gently sloping hillsides and wide, shallow valleys.	There will be displacement of soil by water and wind erosional forces; change in soil structure and natural fertility and significant problems in revegetation and stabilization on steeper slopes.	Significance of the impact will be high. Reconstruction potential is rated as 67% poor and suitability of soil material for reclamability is rated as 49% poor and 5% unsuitable.	Data reliability is 80% from the Rosebud County Soil Series Descriptions and interpretations. Better soils in the bottomlands are more accurately mapped than those on the rangelands and steep-sided slopes.	
Water Resources Ground Water Use in Tract	8 stock wells and 2 household well are in use in the Tract. At least 4 undeveloped springs are in the Tract.	All wells would need to be redrilled if needed after mining. Springs would reappear.	Minimal cost to redrill wells for mining company.	Good	
Quantity	Rosebud coal is saturated in Area C and water flows at 2,000 cu ft/day.	Water would flow into the mine pit at the given rate. During mining about 23 wells and 5 springs outside the Tract would be affected, some of which are in Tract A & B.	Highest anticipated flow rated of Colstrip tracts. Some draw down on company and non-company wells.	Good	
Quality	Medium TDS of 1,200 mg/L for Tract.	Some increases in salinity of wells in and above Rosebud coal seam after mining. Water would still be usable for stock.	Significant and long term.	Good	More research is needed to predict quantitative changes in post-mining quality.

COLSTRIP C

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Surface Water Quantity	E. Fork Armells Creek flows through the Tract. It flows except during extreme periods. Mean annual flow is estimated at 2,200 ac ft. Only 200 acres of the entire Armells Creek drainage is irrigated.	Only slight reduction of flow during mining with adequate stream buffers and diversions Possible slight effect after mining.	Minor	Good	
Quality	Mean TDS is about 2,900 mg/L. High irrigation salinity exists except during high flows. Sediment yield is estimated at 0.5 ac ft/sq mi/yr.	Low flow salinity would increase slightly after mining. Water would still be usable for stock and high flow water spreaders. Sediment yields would be proportional to soil erosion losses.	Slight	Fair-Good	
Alluvial Valley Floors and Flood Plains	Area C is furthest upstream along E. Fork Armells of Colstrip tracts. Through the Tract is a flood plain and an AVF.	Disruption of channel and flow by mining would be less here than downstream Area A and B.	Unknown	Fair-Good	State and federal regulations require restoration of channels.Channel stability depends on techniques used.
Agriculture	There are 841 acres of Class II, III and IV land in the Tract that are presently being cropped and 440 acres of Class III and IV land that are presently being used as tame pastureland.	There will be displacement of lands currently being cropped and used as tame pastureland as well as lands suitable for cropland.	It will reduce the alfalfa hay production by 1792 tons or 27,195 bushels of winter wheat per year for a period of five years.	Data reliability is 80% from the Rosebud County Area Soil Survey.	

ELEMENT	PRESENT SITUATION		ANTICIPATED EFFECT OF LEASING/DEVELOPMENT			SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Vegetation								
Rangeland types	EMU	Acres	Acres being Disturbed					
Ponderosa Pine savannah	Grassland	2101	Grassland	1856	High	High - - - -		
	Sagebrush-grassland	2100	Sagebrush-grassland	1704	High	Long-term elimination of the natural vegetation mosaic and species diversity.	Good	Reclamation of Ponderosa pine not yet proven.
	Ponderosa pine	1154	Ponderosa pine	1154	High			
	Other land	1397	Other land	1397	Low			
		6752		6111				
Animal Unit Month (SVIM)	742 AUMs		High			Loss of 742 AUMs - High	Good	
Animal Unit Month If Range is in excellent condition 100-76%							Good	100% 76% 1178 AUMs - 853 AUMs
Threatened, Endangered or Noxious Species	There are no threatened or endnagered plant species found growing in the EMU. However, there are six noxious species found growing in the Powder River Resource Area, but it has not been determined if these species are found growing in the EMU. The species are: A. Conuolulus arvensis B. Cirsium arvense C. Euphorbia esula D. Centaurea repens E. Cardaria draba F. Centaurea maculosa		Low			Low	Good May 16, 1980 Regional Director Region 6 U.S. FWS Denver, Colorado	

ELEMENT	PRESENT SITUATION		ANTICIPATED EFFECT OF LEASING/DEVELOPMENT		SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Reclamation-Vegetation	On Federal, State and Private lands, the Office of Surface Mining (OSM) assures that the mining company establishes a diverse effective and permanent vegetative cover to standards set by the Department of State lands of Montana and the Federal Bureau of Land Management.		Low		High - failure of Reclamation Low - success of Reclamation	 Good	
Wildlife Habitat	Acres	% of Total	Acres Disturbed*	Year 2026			
Grassland	2101	31	1856	Low negative	Low negative	Good	
Sagebrush-grassland	2100	31	1704	Moderate negative	Low negative	Good	
Ponderosa pine	1154	17	1154	High negative	High negative	Good	Reclamation of ponderosa pine not yet proven.
Other	1397	21	1397	Low negative	Low negative	Good	
Populations	Level of Use						
Mule deer	Average		Low negative		Low negative	Good	Reclamation will minimize impacts.
Antelope	Average		Low negative		Low negative	Good	
Sharp-tailed grouse	Average		Low negative		Low negative	Good	
Pheasant	Low		No change			Good	
Golden eagle	Average		Moderate negative		Low negative	Good	
Other Raptors	Average		Low negative		Low negative	Good	
Non-game birds & mammals	Average		Low negative		Low negative	Good	
State species of special interest or concern	Low		Low negative		Low negative	Good	
Threatened or Endangered	None occur		-----		-----		
			* Based on estimate of mining sequence				

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Cultural/Historical Values	100% of Tract surveyed at low intensity. 8 prehistoric sites, 2 historic sites, one site of undetermined temporal affiliation located. No sites determined eligible for the National Register. 10% probability of locating National Register eligible properties. 63% of known sites located on ridges, 18% on valley floors, 9% on hilltops, 10% on benches.	Direct impact to all cultural resources within tract boundaries.	Damage and destruction of sites, artifacts, environmental context, and data these contain. Reduction of present finite, non-renewable resource base, a long-term loss. Mitigation, while providing as short-term benefit of information gained about prehistory and history, constitutes an irretrievable, irreversible commitment of the resource.	Poor. The inventory (Fredlund and Fredlund 1974) was conducted at low intensity (ca. 107 acres per person/day) without explicit methodology. Significance of properties located is undetermined due to these problems at this time.	Survey methodology and results do not allow reliable estimate of site density. A "best guess", based on intensive work over Area A&B and Big Sky Mine Area A is 2-3 sites per 40 acres. While a qualitative estimate, this is probably accurate due to the environmental similarity of Area C to the other areas near Colstrip which have received more intensive work to date.

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Recreation	No development or known use of the area. Very limited use may occur. Hunting by permission of landowner. No public access exists.	None. No recreation functions are planned for the area and legal access does not exist.	Virtually none on the short term. No effect on a long term basis.	Poor.	Recreation data is virtually non-existent.
Wilderness	No wilderness potential within or near area.	None.	None.	Excellent.	Wilderness inventory complete and area eliminated from consideration.
VRM	Strip-mining occurring nearby. Scenic quality fairly low and dominated by existing mines. Scenic quality class C.	Disturbance of landforms and natural scene. Impacts cumulative with area mines. Some activities visible from county road.	Moderate during mine life. Low after reclamation.	High.	Very difficult to mitigate impacts while mining is occurring.
Noise Air Quality	Noises and odors from artificial origins due to mining activities now occurring in area.	Noises and odors would increase slightly from present levels of industrial influence.	Quite severe during mining. Impact would cease when mine is closed.	Excellent.	Impossible to mitigate during mine life.

COLSTRIP AREA C

ELEMENT	PRESENT SITUATION	ANTICIPATED EFFECT OF LEASING/DEVELOPMENT	SIGNIFICANCE OF ANTICIPATED IMPACT	DATA RELIABILITY	COMMENTS
Transportation:					
Employee	Roads to area adequate. Site access by gravel road.	Increased traffic on State Highway 315. Potential for more accidents.	Moderate on all accounts during mining. Very low after mines close.	Good.	Road improvements should contribute to safety after mining traffic ceases.
Product	Roads adequate for transport. Rail service exists to operating mines and only a short spur is needed to connect with line.	Increased traffic hazards. Increased surface disturbance.	Moderate. Low	Good for all items.	
Land Use	Tract used for ranching. Strip-mining occurs nearby.	Expansion of industrial activities. Land removed from existing uses.	Moderate during mining. Low to none after reclamation.	Good.	

References

U.S. Department of Agriculture, Soil Conservation Service. "Soil Series Descriptions and Interpretations."

U.S. Department of Agriculture, Soil Conservation Service, Soil Survey Staff. "National Soils Handbook."

U.S. Department of The Interior, Geological Survey and Montana Department of State Lands. "Draft Environmental Statement Regional analysis, Northern Powder River Basin Coal, Montana." 1979.

U.S. Department of the Interior, Bureau of Land Management. "Technical Examination and Environmental Assessment, Draft Western Energy "Area A" Extension Coal Lease Application." 1979.

References

Knapton, J.R. and McKinley, P.W. Water Quality of Selected Streams in the Coal Area of Southeastern Montana. USGS Water Resources Investigations 77-80, Helena, MT. 1977.

USGS. Water Resources Data for Montana. USGS Water - Data Report MT-78-1, Helena, MT. 1979.

USGS. Colstrip Project EIS Draft. Proposed Colstrip Project, Rosebud County, MT. 1979b.

Van Voast, W.A., Hedges, R.B., and McDermott, J.J. Hydrogeologic Conditions and Projections Related to Mining Near Colstrip, Southeastern Montana. Montana Bureau of Mines and Geology Bulletin 102, Butte, 1977.

References

Fredlund, Dale E. and Fredlund, Lynn B. Western Energy Company Archaeological Investigations, Rosebud County, Montana, 1973. Butte, Montana: Mineral Research Center. 1974.

Fredlund, Lynn B. Archaeological Survey and Review of Selected Portions of Area B, for Western Energy Company. Butte, Montana: Cultural Resources Division, Mineral Research Center. 1978.

Results of Cultural Resource Projects on Western Energy Area A and Area Extension, for Western Energy Company. Butte, Montana: Cultural resources Division, Mineral Research Center. 1979.

Cultural Resources on Area B - Sections 4, 9 and 10 for Western Energy Company. Butte, Montana: Cultural Resources Division, Mineral Researh Center. 1980a.

Cultural Resources on Area B - Sections 7, 8, 17 and 18; T1N-R41E, Sections 12 and 13; T1N-R40E, for Western Energy Company. Butte, Montana: Cultural Resources Division, Mineral Research Center. 1980b.

Munson, Gene. Cultural Resources Investigation and Assessment in Big Sky Mine Study Area A. Butte, Montana: Cultural Resources Division, Mineral Research Center Reports of Investigations No. 12. 1980.

References

Hickey, W. C. Sr. A Discussion of Grazing Management Systems and Some Pertinent Literature. U.S. Department of Agriculture, Forest Service 1969.

Hunter, H. E., R. L. Ross. Climax Vegetation of Montana. U.S. Department of Agriculture, Soil Conservation Service. 1976.

Payne, G. F. 1973. Vegetative Rangeland Types in Montana: Bozeman, Montana Agricultural Experiment Station, Bulletin 671. 16 p.

U.S. Department of Agriculture, Soil Conservation Service. Technicians Guide Section II-E-3 Range Site Criteria. 1972.

U.S. Department of Agriculture, Soil Conservation Service. Rosebud and parts of Big Horn County, Advanced Material Subject to Review and Approval. March 1977.

U.S. Department of Agriculture, Soil Conservation Service. National Range Handbook. 1976.

U.S. Department of Agriculture, Soil Conservation Service. Technicians Guide IIE. Range Site Criteria. 1972.

U.S. Department of Agriculture, Soil Conservation Service. Climax Vegetation of Montana. 1976.

U.S. Department of Agriculture, Soil Conservation Service. Technicians Guide Section II-E-3 Range Site Criteria. 1973.

U.S. Department of Agriculture, Soil Conservation Service, U.S. Department of Interior, Bureau of Indian Affairs, and Montana Agricultural Experiment Station. Soil Survey of Big Horn County Area, Montana. Issued 1977.

U.S. Department of Agriculture, Forest Service and Soil Conservation Service, U.S. Department of Interior, Bureau of Land Management and Montana Agricultural Experiment Station. Soil Survey of Powder River Area, Montana. Issued 1971.

U.S. Department of Interior, Geological Survey and Montana Department of State Lands. Northern Powder River Basin Coal. Montana. 1979.

U.S. Department of Interior. Bureau of Land Management. Soil Vegetation Inventory Methods. 1979.

U.S. Department of Interior, Bureau of Land Management Forage Requirements Range Workshop. Albuquerque, New Mexico. 3/13/80.

Wildlife Management Institute. If Deer Are to Survive. Stackpole Books, Harrisburg, PA 1971.

Consultation

Coenenberg, J. Vegetation Specialist, Western Energy Company, Colstrip Montana. 1980.

Hemmer, D., Montana Dept. of State Lands. 1980.

References

Ecological Consulting Service "Annual Wildlife Report of the Colstrip Area-for 1979." Western Energy Company, Colstrip, Montana, 1980.

USDI/BLM. Powder River Resource Area, Management Framework Plan Amendments. Miles City, Montana, June, 1980.

USDI/BLM. Powder River Resource Area, Management Framework Plan Update Report. Miles City, Montana, July, 1979.

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